REMARKS

Claims 1-6, 8-11, 14, 15, 19-22, 24-33, and 41-49 are currently pending in the present patent application.

In the Office Action, the Examiner rejected claim 2-6, 15, 20-22, 24-31, 41-44, and 46 under the second paragraph of 35 U.S.C. § 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 6, 15, and 24 have been amended to eliminate any deficiencies under Section 112. These amendments should not be construed to narrow the scopes of these claims, but instead merely expressly recite what was inherently recited in the prior versions of the claims.

With regard to claims 2, 24, and 46 the Examiner states that it is "unclear as to how an etching voltage can vary between a condition (plasma) and a physical location (wafer)." A plasma is one of the four states of matter, along with solid, liquid, and gas. A plasma is a "highly-ionized gas" as defined by Webster's Encyclopedic Unabridged Dictionary of the English Language (1994 Edition), or more specifically is a collection of charged particles containing about equal numbers of positive ions and electrons. A plasma is not a "condition" but is a state of matter, and a voltage drop between the plasma and the wafer (a solid form of matter) is clear and will be understood by those skilled in the art. There is really no difference between talking about a voltage drop across two solid forms of matter, such as two copper wires, or such a voltage drop across a gas and a solid, or across a plasma and a solid. Accordingly, claims 2, 24, and 46 satisfy Section 112.

Amended claim 1 recites a process for forming trenches with an oblique profile and rounded top corners. The process includes through a first polymerizing etch, forming in a semiconductor wafer depressions delimited by rounded top corners. Through a second polymerizing etch, trenches are opened at the depressions. The second polymerizing etch is performed in variable plasma conditions to form trenches with oblique profiles having a substantially constant slope.

Figures 15, 18, and 19, for example, of the present application illustrate a trench 31 formed by a process according to one embodiment of the present invention. The trench 31 includes walls 37 with a constant slope or angle α, with these walls forming this angle with respect to a surface parallel to a face 38 of the substrate 21.

In contrast the trench 31, Figure 6 of Chen illustrates trenches formed according to the disclosed processes. A multistep plasma etch is performed to form shallow trenches with round corners and a tapered profile in a semiconductor wafer as shown in Figure 6. To form these trenches, Chen varies the applied RF-power and the pressure of the plasma during a three step etch during which the polymerization rate is controlled to provide top and bottom round corners and a tapered profile. *See, e.g.,* column 3, lines 29-47. As plainly shown in Figure 6 of Chen, the disclosed process results in the sidewalls of the trenches having a continuously varying slope and not a substantially constant slope. Chen neither discloses nor suggests controlling the polymerization (or polymer microdeposition) rate such that the trenches have inclined walls with a substantially constant slope in addition to rounded top corners.

Returning now to claim 1, Chen neither discloses nor suggests a second polymerizing etch being performed in variable plasma conditions to form trenches with oblique profiles having a substantially constant slope. In contrast, the slope of the sidewalls of trenches formed according to Chen is continually varying as shown in Figure 6. The combination of elements recited in amended claim 1 is therefore allowable.

Dependent claim 2 recites the process according to claim 1 in which forming the second polymerizing etch includes varying an etching voltage between the plasma and the wafer. Chen neither discloses nor suggests controlling the polymerization rate by varying the voltage drop between the plasma and the semiconductor wafer. Quite to the contrary, the different steps of polymer deposition during the plasma etch of Chen are obtained by simultaneously varying two parameters, namely pressure of the plasma and RF-power. With this approach, pressure is an important parameter because plasma stabilization is strongly affected by changes in pressure, especially when RF-power variation is simultaneously involved. As a result, the plasma takes a relatively long time to stabilize and fluctuations lead to abrupt modifications in the etching conditions. The plasma structure itself may be strongly affected (*e.g.,* density, chemical species, mean free path) and discontinuities or uneven profiles may thus result (*e.g.* a snaked profile, or slope changes at the etching steps). Thus, the process of Chen is not amenable to forming sidewalls having substantially constant slopes.

In contrast to Chen, varying only the voltage drop between the plasma and the semiconductor wafer according to embodiments of the present invention enables precise

control of the polymerization rate. This is true because the plasma is only slightly affected using this approach. The pressure and RF-power do not need to be modified according to embodiments of the present invention, but instead may be kept constant, which is in contrast to the approach taken by Chen to control the polymerization rate by controlling RF power and pressure and thereby control the slopes of the sidewalls of the trenches.

Dependent claim 2 is allowable for at least the same reasons as claim 1, and for these additional reasons. Dependent claims 24 and 46 are also independently allowable for reasons similar to those just set forth for dependent claim 2. Claim 19 recites, in part, forming a trench that has inclined walls with a substantially constant slope and with rounded top corners. As discussed with regard to claim 1, Chen neither discloses nor suggests forming such a trench and the combination of elements recited in amended claim 19 is therefore allowable.

Amended claim 45 recites a method for forming trenches with an oblique profile and rounded top corners in a wafer. The method includes forming depressions delimited by rounded top corners in a wafer with a first polymerizing etch. Trenches are formed at the depressions with a varying plasma polymerizing etch. The oblique profile of each trench has approximately the same angle relative to a surface parallel to a face of the wafer.

In the embodiments shown in Figures 15, 18, and 19 of the present application, the oblique profile of the trench 31 has approximately the angle α relative to a surface parallel to a face 38 of the substrate 21. Thus, the oblique profile of each trench has approximately the same angle relative to a surface parallel to a face of the wafer. In contrast, there is not a definable angle of the oblique profile of each trench in Chen due to the constantly varying angle that would be present at any tangent to the constantly varying sidewalls, (See Figure 6 of Chen). The combination of elements recited in amended claim 45 is accordingly allowable.

All dependent claims are allowable for at least the same reasons as the corresponding independent claims, and due to the additional limitations added by each of these claims.

In the above discussion, it should be noted that the discussion regarding the differences between some of the disclosed embodiments of the present invention and the applied Chen reference should not be construed to define the scope or interpretation of any of the claims. These disclosed embodiments of the invention are discussed in comparison

to the applied reference merely in order to help the Examiner appreciate certain distinctions between the pending claims and the subject matter of the applied reference.

The claims are in condition for allowance, which is respectfully requested. In the event additional fees are due as a result of this amendment, you are hereby authorized to charge such payment to Deposit Account No. 07-1897.

If the Examiner believes that a phone interview would be helpful, he is respectfully requested to contact the Applicants' attorney, Paul F. Rusyn, at (425) 455-5575.

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Respectfully Submitted,

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